

Canada's oil sands: meeting future energy demand

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Alberta, Canada has a long-entrenched international reputation as place of abundant natural beauty. From the majestic Rocky Mountains, to rich prairies and vast forests, its natural heritage is cherished worldwide.

Recently, the world's attention has been equally focused on what lies below the surface – the second-largest proven oil reserves in the world, the Alberta oil sands.

Alberta now has great opportunity to help play a significant role in meeting growing global energy demand. It also has a responsibility to advance technological solutions that not only apply to environmental challenges with oil sands development but help with sustainable energy extraction worldwide.

The Alberta innovation that helped unlock the resource is also being used to open the door to a cleaner energy future.

Unlocking the resource

Although always a major player in the conventional North American oil and gas industry, it took a technological awakening to put Alberta's oil sands on the international agenda. Once considered too remote, too difficult to extract and too expensive to produce, the potential of the Athabasca oil sands has grown from initial 1999 estimates of about five billion barrels to today's estimate of 170 billion barrels of proven, extractable oil. Technology is what got Alberta to this point in less than a decade. While it may not be achieved in our lifetime, the oil sands contain some 1.7 trillion barrels of bitumen.

Alberta's proven reserves are second only to Saudi Arabia. As traditional sources of crude oil are depleting, Alberta will increasingly be relied upon to meet the need.

As the only non-OPEC, OECD producer with the potential to substantially increase energy production in the short term, Alberta is well on its way to being counted among the major energy suppliers to the world.

Growing energy demand

World energy demand is forecasted to increase by 40 per cent in the next two decades. While there is recognition that the world must transition to alternate forms of energy, carbon-based sources will continue to represent the lion's share. Estimates of oil demand in 2035 range from 97 million to 113 million barrels per day. It is imperative that the world get its energy to heat homes and fuel engines from jurisdictions that take their environmental responsibilities seriously. Offering a secure, reliable and safe energy source regulated by a stable, democratic government, Alberta is undoubtedly one of those jurisdictions.

Creating opportunities

However, there's more to the story than just meeting global energy demands. Oil sands activity has major economic

benefits, both inside and outside Alberta. An October 2009 report by the Canadian Energy Research Institute found oil sands development will result in an estimated 343,000 new US jobs between 2011 and 2015. The report also suggests an additional US\$34 billion to US GDP in 2015, US\$40.4 billion in 2020, and US\$42.2 billion in 2025. Between 2000-20, the oil sands are expected to generate over 5 million person-years of employment with over one-third of this employment occurring outside Alberta. Investment is forecasted to exceed US\$135 billion over the next three to five years.

Technological innovation spurs opportunity

Success wasn't always in the cards. Historically, the cost of extracting oil from the bitumen sands was enormous – the market value of extracted crude would not cover the capital costs, labour and energy required in the recovery process. Through extensive research into technological solutions, the potential of the oil sands grew exponentially from the inception of the first commercially-viable facility in 1967. Since that time, limited open-pit mining has rapidly evolved into deep underground extraction techniques (in situ) that are less disturbing to the land. In situ methods now account for more than half of oil sands extraction in the region. In total, 80 per cent of the proven reserves are most economically extracted using this technology.

The discovery of cyclic steam stimulation and steam assisted gravity drainage techniques was the biggest factor leading to success. Today, research and development by government, industry and academic partners continually improve upon these techniques while finding new, more efficient and reliable extraction methods.

Overcoming environmental challenges

Although the oil sands are in themselves a solution to meeting growing energy demands, the extraction processes come with their own set of challenges. As technologies evolve to increase the productivity and efficiency of oil sands facilities, research is also focusing a great deal of attention towards mitigating environmental impacts.

Like all large-scale, long-term industrial operations, oil sands extraction has a significant impact on the environment. These are formidable challenges that face the government of Alberta and the oil sands industry. Water use and water quality, tailings pond management, air emissions, greenhouse gases and land reclamation each require unique solutions. Strong legislation and stringent monitoring forms the basis of ensuring environmental integrity. But the real solutions will be found through ongoing, comprehensive research into technological answers to these big ticket questions.



Clean energy research and innovation

Over the next five years, Alberta is expected to invest US\$6.1 billion on green technology – that's more than all the other provinces combined, according to a recent report by the Conference Board of Canada. This includes a commitment of US\$2 billion towards carbon capture and storage technology. This is one of the largest investments of its kind

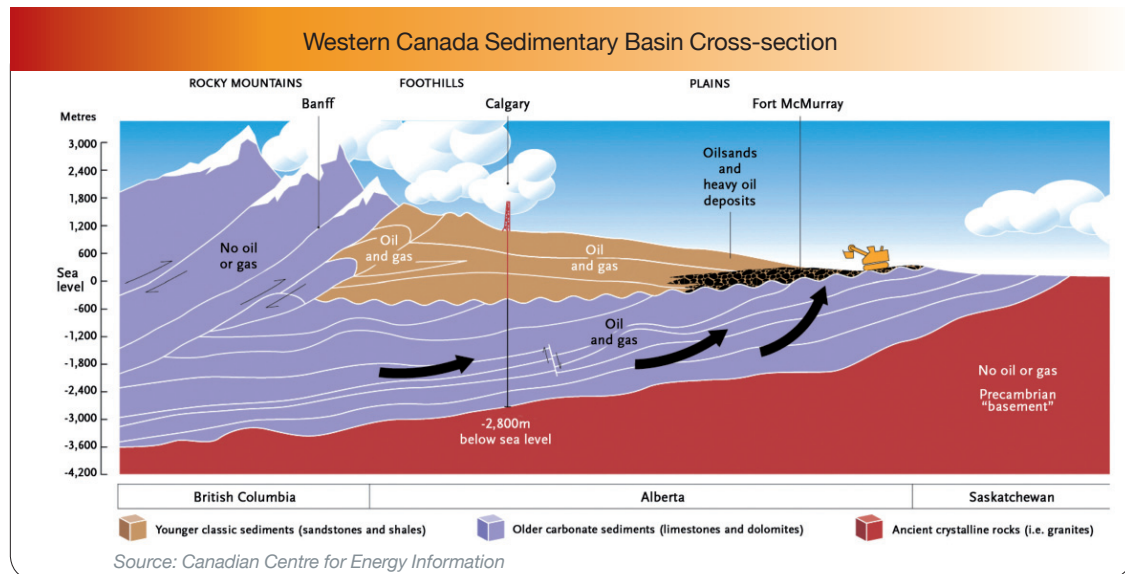
in the world in game-changing technology that the Canadian and US governments and global experts deem essential to a cleaner energy future. Alberta is already developing a collection of CCS projects, pipelines, storage and financing that is unique in the world.

More than US\$1 billion has been invested by the Alberta government and industry in research and development at academic institutions across the province. Clean energy research focusing on improvements in the oil sands sector is occurring at the two leading universities in the province: the Centre for Oil Sands Innovation at the University of Alberta and the Alberta Ingenuity Centre for in Situ Energy at the University of Calgary.

Government, industry and academic and research centres are committed to finding new and better ways to more quickly reclaim land, further reduce the volume of fresh water used, decrease the size of tailings ponds and increase energy efficiency in the oil sands region.

Addressing climate change

Alberta is also the only jurisdiction in North America with mandatory reduction targets for large emitters across all sectors. This programme incentivises companies to invest in best technology to ensure continued reductions. While the oil sands region accounts for less than one-tenth of one per cent of global emissions, reducing greenhouse gas emissions is top-of-mind. To date, the oil sands region has reduced GHG emissions per barrel of oil by an average of 39 per cent since 1990, with some facilities achieving reductions as high as 45 per cent.



State of the environment

The oil sands region is Alberta's most heavily monitored region for air, land and water quality. Data from ongoing monitoring partnership organisations helps tell another success story: solutions to environmental challenges are being found. Air quality in the oil sands region is monitored 24 hours a day, 365 days a year and is rated as good 95 per cent of the time. Water monitoring in the regions waterways show no detectable contamination from oil sands operations. While the overall state of the environment is good, ongoing work will ensure continuous improvement.

Investing in the future

The oil sands have always been about innovation and that will continue because not all the answers have been found. There continue to be challenges associated with oil sands production and there's a lot of work yet to complete. Although solutions will not be developed overnight, government and industry are committed to finding new and better solutions. The past few years show remarkable gains in production efficiency, with few emissions, less energy and less water needed to produce a barrel of oil sands-derived crude. The trend will continue, but we still have a ways to go.

The world will be dependent on carbon-based fuel for some time to come. Alberta's goal is to be a world class energy supplier and champion of energy technology, while ensuring that development happens in the most socially and environmentally responsible way. The growing global energy demand must be met – Alberta can play a significant role in meeting this demand in a responsible fashion. □